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NXP, B.V.

NXP INTELLECTUAL PROPERTY & LICENSING

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EXAMINER

CHEN, DAVID Z

ART UNIT

PAPER NUMBER

2815

NOTIFICATION DATE

DELIVERY MODE

12/09/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

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ip.department.us@nxp.com

DETAILED ACTION

1. The request for reconsideration has been considered but does NOT place the application in condition for allowance because: Applicant argues “In contrast, the Office Action acknowledges (at page 11) that ‘481 reference does not specifically disclose a vertical trench capacitor and a vertical interconnect sharing a common dielectric material of ‘a single deposition layer’”. This is not found persuasive because the limitation “a single deposition” is considered as a product-by-process limitation. When the end product is the same or obvious from a product of the prior art, the claim is unpatentable. The ‘481 reference does disclose using silicon nitride (3020) as the dielectric material for the trench capacitor and the ‘481 reference shows a single dielectric layer for the capacitor and the interconnect in Fig. 3b. Further, the ‘481 specifically discloses a commonly owned patent, which is the ‘769 reference that discloses a method for forming a via or vertical interconnect structure. The ‘769 reference discloses using Si_3N_4 as the dielectric material for the via or vertical interconnect structure (See Fig. 2, Column 6, lines 11-29). Although the ‘769 reference refers Si_3N_4 as silicon nitrate, it is well known in the art silicon nitride has the stoichiometry of Si_3N_4 . Thus, the combined references of ‘481 and ‘769 produces a single silicon nitride layer for the vertical trench capacitor and the vertical interconnect. The product-by-process limitation was rejected as a result of the end product of the combined structure of the ‘481 and ‘769 references and the rejected process and the end product ends up containing a single silicon nitride layer. The fact that the silicon

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nitride material is not directly formed but is instead formed by combination does not change the end product.

2. Applicant further argues "The '769 reference discloses a similar dielectric material (in referring to "Silicon Nitrate" rather than Silicon Nitride), nothing in the reference suggests that the via dielectric layer also acts as a dielectric for a trench capacitor (or any other device)". This is not found persuasive because the '481 reference discloses the vertical interconnect and using silicon nitride as the vertical trench capacitor and the only teaching from the '769 reference is the using of silicon nitride for the vertical interconnect. Thus the combined structure of the '481 and '769 references discloses the silicon nitride layer as a dielectric layer for both the vertical trench capacitor and the vertical interconnect.

3. Applicant further argues "In this instance, the teaching away in the '481 reference is evidenced in the reference itself, which explicitly teaches away from the combination with the '769 reference as asserted (to form a common dielectric layer). Specifically, the '481 reference acknowledges the method of manufacture of vertical interconnects described in the '769 reference (Col. 4:16-17), but requires that the corresponding dielectric layer be separate (and is formed in a separate, not common, step). The proposed combination and the disclosed approach in the '769 reference thus does not and cannot correspond to a single layer as claimed". This is not found persuasive because the '481 reference discloses the high k dielectric film that can be silicon nitride and is deposited by CVD and the electrode for the capacitor material may be formed of copper that is also deposited by CVD (See Column 5, lines 11-22). The '769 reference

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also discloses the dielectric material for the via or interconnect structure is Si_3N_4 , commonly known as silicon nitride, that is deposited using CVD and the via or interconnect material is copper (See Column 6, lines 11-29) as same as the '481 reference. Thus, when a dielectric material is formed by the same method with the same material, the combined references of '481 and '769 reference will produce silicon nitride as "a single layer". Thus, since there is no structural difference between the dielectric materials used in the vertical trench capacitor and the vertical interconnect, "a single layer" is formed and meets the limitation of "being common material formed from a single deposition layer".

4. As discussed above, the Final Rejection is maintained.